

4K88-3

PENINSULA/ALEUTIANS HERRING SAC-ROE FISHERY

REPORT TO THE BOARD OF FISHERIES

By:

Len Schwarz

Regional Information Report<sup>1</sup> No. 4K88-3

Alaska Department of Fish and Game  
Division of Commercial Fisheries  
211 Mission Road  
Kodiak, Alaska 99615

November 1988

<sup>1</sup> The Regional Information Report Series was established in 1987 to provide an information access system for all unpublished divisional reports. The reports frequently serve diverse ad hoc informational purposes or archive basic uninterrupted data. To accommodate timely reporting of recently collected information, reports in this series may contain preliminary data; this information may be subsequently finalized and published in the formal literature. Consequently, these reports should not be cited without prior approval of the author or the Division of Commercial Fisheries.

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## AREA DESCRIPTION

The Peninsula/Aleutian Management Area is described as statistical Area "M", which includes South Peninsula and Aleutian waters west of Kupreanof Point to the International Date Line and North Peninsula waters extending from the International Date Line east to Cape Menshikof (Figure 1).

## 1988 SEASON SUMMARY

By regulation, the commercial herring sac-roe season in Area "M" extends from April 15 through July 15. However, for the first time the opening of the Port Moller District was delayed by emergency order until May 28. During the 1988 season commercial deliveries on the Alaska Peninsula occurred from May 28 through June 20. The total Peninsula harvest of 671 short tons (s.t.) was below the recent 5 year average of 866 tons; no sac-roe harvest occurred in the Aleutian Islands (Table 1). Fourteen purse seine vessels and 2 gillnet vessels made deliveries to the four companies that bought fish. The average roe recovery was 8.3%. The average price per ton was \$1,000 for 10% roe recovery making the fishery worth approximately \$557,000 to the fishermen.

## NORTH PENINSULA

### Historical Perspective:

The observed presence of commercial quantities of sac-roë herring on the North Peninsula has been centered around Port Moller and Herendeen Bay. No commercial herring landings occurred in the area until 1982 when 506 tons were harvested (Table 1).

Prior to 1982, there had been reports that in some years herring were present during the spring near the Peter Pan dock in Port Moller, however abundance was unknown. Numerous schools of herring were documented in the Herendeen Bay Area during 1976 through department aerial surveys. The first year that aerial surveys were able to locate herring schools in Port Moller Bay (and thus document biomass estimates for both Moller and Herendeen Bay) was 1984. Fishing vessels destined for the Togiak fishery frequently stopped in the Port Moller Area in past years to prospect for herring, however there were no reported landings prior to 1982 (Table 1). Since 1982, a commercial sac-roë fishery has developed in both Moller and Herendeen Bays and along the Bering Sea coast eastward from Port Moller for a short distance (Table 2). The run timing of these stocks appear to be slightly later than the Togiak stocks.

### 1988 NORTH PENINSULA SUMMARY

The entire North Peninsula opened to commercial herring fishing by regulation on April 15, however the opening of the Port Moller District was delayed until May 28. The herring fishery occurred only in the Port Moller District (Figure 2) from May 28 to June 17 with 9 seiners landing 294 tons (Table 3). The average roe recovery was 8% with an average price of \$1,000 for 10% roe recovery, with \$100 for every percentage point above or below 10%. The North Peninsula fishery was worth approximately \$235,000 to the fishermen.

As in 1986 and 1987, the closure of the Togiak fishery before the Port Moller fishery was underway resulted in a large fleet going

to Port Moller. There were 61, 40 and 55 purse seine vessels present for the 1986, 1987, and 1988 fisheries respectively. As in the past several years, only a small percentage of the vessels present actually made deliveries. Nine of the 55 vessels made deliveries in 1988. Also of the 10 registered companies represented by 22 tenders, only 3 companies bought herring.

#### Preseason:

Prior to the 1988 sac-roe herring season, a harvest guideline range of 500-1,000 tons was established in the Port Moller District. In 1986 a trend began of increasing fishing effort effectively harvesting fish that returned first. In order to shift fishing pressure from what may be earlier arriving smaller stocks, to a later arriving more abundant stock, the Port Moller District opening was to be delayed until May 28. A stipulation was added that the fishery would be opened if, due to run timing, a large biomass was spotted before May 28.

#### Fishery:

On May 27, the day before the scheduled opening, there were approximately 55 seine vessels on the grounds. Aerial surveys of the Port Moller District had been flown and very few fish had been spotted. In order to give fishermen an opportunity to harvest a small portion of the earlier arriving fish a 12 hour opening was announced for May 28. This opening resulted in a harvest of only 5 tons from Herendeen Bay. There were reports of several small schools of spawned out fish being caught and released in Moller Bay. Also juvenile herring were reported in Herendeen Bay.

Due to the extremely large fishing effort present and the absence of fish, further openings were delayed. By June 2 the fishing fleet was still large with 25 seine vessels present and still no significant spawning biomass.

The Department was concerned that a continued closure of the Port Moller District could result in a biomass moving into the district, spawning, and then leaving before they could be detected. This occurrence was possible because of muddy water, periods of time when flying is prohibited due to weather, and past fish behavior of entering and leaving the district rapidly. On the other hand, there was concern of overharvesting herring due to the large fishing effort present. In order to allow fishermen an opportunity to harvest fish and still protect against an overharvest, scheduled 3 hour daily test fishing periods were announced for June 2, 3, and 4.

On May 30 there were approximately 400 tons of herring spotted at the head of Herendeen Bay. Department ground crews with the aid of a commercial seine vessel documented these herring to be juveniles. To protect these fish and also provide less opportunity for a large overharvest, waters south of a line from Entrance Point to Point Divide to Black Point remained closed during the scheduled June 2, 3, and 4 openings.

No catches resulted from the openings on June 2, 3, and 4. Fishing effort had decreased only slightly to 20 seine vessels. No major biomass had been spotted, however about 200 tons of spawning herring were observed on a department survey in the closed waters of Moller Bay on June 3 (Table 4). In order to continue to provide fishermen an opportunity to harvest herring, the 3 hour daily test fishing schedule was continued. On June 6 the opportunity to harvest fish was again increased by reducing the closed water section of the district to just the head of Herendeen Bay in order to protect the juvenile fish that were present there (waters remaining closed were Herendeen Bay waters south of a line from Bold Bluff Point to Crow Point). Reducing the closed water area to provide more opportunity to harvest herring was justified because the harvest at this time was only 8 tons for the entire district. Although no major biomass had been spotted, spawned out fish were caught and released during the May

28 opening and 200 tons of spawning fish were observed on a survey June 3, indicating that some fish had entered the district, spawned, and left. The fishing effort was still fairly high with 11 seiners and 10 tenders on the grounds so the open daily fishing period remained limited to 3 hours to prevent an overharvest. The harvest remained low (8 tons) and fishing effort dropped to about 6 seine vessels and 3 tenders on June 8 so fishing time was increased to 24 hours/day.

The harvest in Moller Bay began on June 9 and continued until June 17 for a total Moller Bay harvest of 294 tons (Table 3). On June 17 Moller Bay waters were closed to prevent an overharvest. Although no accurate biomass estimates were made, it was speculated that based on test fishing results and aerial survey data, the Moller Bay biomass probably did not exceed 1,500 tons and that any additional harvest would exceed the desired harvest guideline of 20%. With the exception of Moller Bay and the head of Herendeen Bay, Port Moller District waters remained open to allow further harvest if a biomass did appear. No further deliveries were made after June 17.

From the narrative above, it can be seen that the Port Moller herring fishery can be difficult to manage. In the past, herring have arrived, spawned, and left quickly, often on one tide. Extremely muddy water and frequent poor weather make estimating biomass very difficult. These factors coupled with the tremendous fishing effort make it difficult to adequately estimate the herring biomass and exploit these stocks with the precision stated in the management plan (0-20%).

#### Biomass:

During the past 3 seasons intensive aerial surveys were conducted by the industry. Survey effort has ranged from 7 to 20 aircraft present, with 17 aircraft on the grounds in 1988. From May 17 through June 15 the Department flew 16 aerial surveys (Table 4). The largest herring biomass was observed at the head of Herendeen

Bay and was documented to be juvenile herring by a Department observer aboard a commercial seine vessel. Discounting the documented juvenile herring in Herendeen Bay (May 29 - June 3), the largest biomass was observed on May 23 when 615 tons were spotted. (Some of these fish may have been juveniles.) The next largest biomass was 217 tons observed on June 3. Industry spotters were not able to document a biomass larger than indicated on Department surveys.

A minimum spawning biomass estimate can be derived by adding the fish seen on May 23 (615 tons), the fish seen around Deer Island on May 26 (100 tons), the fish seen in Moller Bay on June 3 (217 tons), and the harvest which was made after June 8 (286 tons). This minimum estimate totals 1,218 tons. It is quite likely that additional fish were present but not counted. For example, two different spawning groups of fish were observed in Moller Bay. Moller Bay is often muddy and is not surveyed every day, so it is possible that additional fish spawned and left the area without being documented. Whether a large biomass of fish was present but not documented is possible but not very likely due to the intensive amount of survey effort present.

Biomasses greater than 1,500 tons are only documented sporadically in the Moller District. During 1985 and 1987 biomass estimates of 5,000 tons were obtained, although the 1985 estimate was questionable due to the presence of capelin and other schooling fish. The reason for the sporadic yearly appearance of a spawning biomass can be explained in several ways. As stated before it's possible that on certain years fish move in and out of the area quickly without being detected. Also it is possible that the herring do not return to the exact spot each year to spawn. For example, in Norton Sound, where yearly fish abundance and location lends itself more to documentation, large tonnages of fish will commonly change spawning location by 75 miles from year to year depending on the location of the ice pack. If yearly changes of this magnitude occurred in the Port Moller



District, it is possible that fish may be in Moller Bay one year and Izembek/Moffet, Nelson Lagoon, Ilnik, or Port Heiden the next year. Offshore spawning could also explain the yearly fluctuations of herring biomass in the Port Moller District. Whatever the reason, biomass estimates are widely variable from year to year. This year's minimum estimate of 1,200 tons does not come close to last year's estimate of 5,000 tons.

#### Age Class

The bulk of the harvest, which came from Moller Bay was supported by ages 4 and 5. These two year classes comprised almost 60% of the total samples (Table 5). This was expected as the bulk of the harvest was made up of 4 year old fish in 1987 (Table 6, Outer Moller).

## SOUTH PENINSULA

### Historical Perspective

The South Peninsula herring sac-rope fishery began to develop in 1979. Significant landings occurred in 1980 (453 tons), and peaked in 1981 (716 tons) (Table 1). A Board of Fisheries regulation closed the South Peninsula sac-rope fishery in 1983 in favor of a food and bait fishery. The food and bait fishery did not develop and the sac-rope season was reopened during the 1984 season. During the years in which a harvest occurred, landings were reported from 16 separate geographical locations, of these only Canoe Bay produced a harvest each year (Table 7). Beginning in 1984 the Board of Fisheries established that the fishery would be managed to allow a sac-rope as well as food and bait harvest. The sac-rope harvest was to be 75% of the allowable harvest with the remaining 25% allocated to the food and bait fishery. The food and bait fishery has not developed.

From 1981 through 1988 ADF&G has deployed field crews along the South Peninsula to gather biological data and to monitor the commercial fishery. Crews have been stationed in Canoe Bay each season (1981-1988) and intermittently in the other harvest locations or in locations of suspected commercial fishery potential. The crews have been successful in collecting samples and documenting spawning. Aerial fixed wing surveys have been utilized with limited success due to the large area involved and the sporadic and unpredictable appearance of the fish.

### 1988 South Peninsula Summary

Harvest guidelines were established preseason based on past fishing performance and general information on stock size gathered from Department and industry aerial surveys. After being closed for 2 years due to a trend in decreasing stock abundance, Stepovak Bay was opened for limited exploration. Areas where little information on stock size was known were left open for exploration.

The commercial sac-roë fishery on the South Peninsula occurred in 7 locations: Canoe Bay, Pavlof Bay, Lenard Harbor, Volcano Bay, Belkofski Bay, Balboa Bay, and Stepovak Bay (Table 1). As usual, the majority of harvest (63%) came from Canoe Bay. From May 14 to June 20, 376.8 tons were harvested by 5 seine vessels and 2 gillnet vessels. The gillnet harvest was less than 1 ton. The average roë recovery was 8.6% with an average price of \$1,000/ton for 10% roë recovery making the value to the fishery approximately \$324,000 to the fishermen.

The Board of Fisheries has directed the staff to permit 75% of the allowable harvest to be taken for sac roë and the remaining 25% for food and bait. Due to the small harvest guideline involved and the large harvesting potential of a purse seine vessel, the entire guideline may be taken before a closure can be announced. When this happens the area is closed for both sac-roë and food and bait so that the overall guideline will not be exceeded. This was the case in Canoe and Balboa Bays. Other South Peninsula waters were open for food and bait exploration but no catches were reported.

Intensive aerial surveys to document spawning biomass on the South Peninsula are not possible because of the large area involved, the sporadic and unpredictable appearance of fish, and because the fishery takes place during the middle of the June red salmon fishery when the availability of personnel is limited. Table 9 lists the surveys that were flown. Surface area of schools sighted is recorded in the form of R.A.I. (relative abundance index) units. R.A.I. units are an expression of total surface area of sighted herring schools in terms of small schools (surface area equal to 538<sup>2</sup> ft.). No attempt is made to convert these units into tonnages due to the lack of conversion factors for deep waters. Many of the schools sighted were probably capelin, especially in Stepovak Bay where a seine vessel and spotter aircraft set on many capelin schools but could not find herring schools.

#### Age Class Composition

The dominant age class on the South Peninsula was age 4 (Table 10). This was not surprising as there was a good showing of 3 year old fish in 1987 (Table 11), An encouraging amount (25%) of 3 year old fish were represented throughout the South Peninsula in 1988. The 1988 fishery was largely supported by younger fish as opposed to the 1986 fishery which was supported by older fish (Figure 4).

Table 1. ALASKA PENINSULA-ALEUTIAN ISLAND AREA HERRING SAC-ROE  
HARVESTS (Short Tons)

Year	South Peninsula	Aleutian Islands	North Peninsula	Total
1979	10	-	-	10
1980	454	-	-	454
1981	716	-	-	716
1982	138	-	506	644
1983	-	-	627	627
1984	211	-	431	642
1985	345	-	716	1,061
1986	281	-	889	1,170
1987	319	-	512	831
1988	377	-	294	671

Table 2. ANNUAL HARVEST OF PORT MOLLER HERRING BY GEOGRAPHICAL AREA

Location	1982	1983	1984	1985	1986	1987	1988
Deer Island	-	-	-	73	41.5		-
Herendeen Bay	280	510	181	100	112.5	160.8 <sup>a</sup>	8.2
Moller Bay	180	36	250	256	261.4	344.3	285.5
Bear River/E. Bering Sea Coast	<u>46</u>	<u>81</u>	<u>-</u>	<u>287</u>	<u>473.5</u>	<u>7.3</u>	<u>-</u>
TOTAL	506	627	431	716	888.9	512.4	293.7

<sup>a</sup>At least 11 tons were taken around Deer Island.

Table 3. 1988 NORTH PENINSULA COMMERCIAL SAC-ROE HERRING HARVEST  
(Short Tons)

<u>Date</u>	<u>Herendeen Bay</u>		<u>Moller Bay</u>	
	Tons	Roe %	Tons	Roe %
May 28	4.8	9.0		
June 6	3.4	7.2		
June 9			66.9	7.3
June 10			6.9	5.7
June 12			6.7	8.6
June 16			136.0	8.5
June 17			69.0	9.0
SECTION TOTALS	8.2	8.2%	285.5	8.0%
NORTH PENINSULA TOTAL			293.7	8.0%

Table 4. 1988 ALASKA DEPARTMENT OF FISH AND GAME NORTH PENINSULA HERRING AERIAL SURVEYS BIOMASS ESTIMATES (Short tons)

Date	Deer Island			Herendeen Bay			Moller Bay			Bear River		
	RAI <sup>a</sup>	Tons <sup>b</sup>	Rating <sup>c</sup>	RAI	Tons	Rating	RAI	Tons	Rating	RAI	Tons	Rating
May 17	0	0	A	8	(20)	A	0	0	B	0	0	B
May 19	0	(0)	B	5	(13)	B	0	(0)	B	0	(0)	D
May 23	0	(0)	B	151	(390)	B	137	(225)	B	0	(0)	B
May 26	63	(100)	B	0	(0)	B	-	-	-	-	-	-
May 27	5	(7)	B	19	(49)	C	0	(0)	B	0	(0)	C
May 28	0	(0)	B	0	(0)	C	0	(0)	B	-	-	-
May 29	5	(8)	B	45	(116)	C	0	(0)	B	0	(0)	B
May 30	15	(23)	C	153	(395)	B	0	(0)	C	0	(0)	C
May 31	-	-	-	-	-	-	0	(0)	C	0	(0)	B
June 1	0	(0)	C	270	(697) <sup>d</sup>	B	0	(0)	C	0	(0)	C
June 3	0	(0)	A	302	(780)	A	143	(217)	A	0	(0)	C
June 6	0	(0)	B	0	(0)	B	0	(0)	B	0	(0)	B
June 9	-	-	-	0	(0)	C	0	(0)	C	-	-	-
June 10	-	-	-	-	-	-	0	(0)	B <sup>e</sup>	5	(8)	B
June 11	0	(0)	B	-	-	-	0	(0)	B <sup>e</sup>	-	-	-
June 15	0	(0)	C	-	-	-	-	-	C <sup>e</sup>	-	-	-

R.A.I. units express the entire surface area of sighted herring schools in terms of small schools (surface area equal to 538<sup>2</sup> ft.). For example 10 R.A.I. units is equivalent to 10 small herring schools each with a surface area of 538<sup>2</sup> ft.

<sup>a</sup>Relative Abundance Index: small school (less than 538<sup>2</sup> ft) = 1 R.A.I. unit  
medium school (538<sup>2</sup> ft to 4,841<sup>2</sup> ft) = 5 R.A.I. units  
large school (square ft./538<sup>2</sup> ft)

<sup>b</sup>Tons: RAI units are multiplied by 1.52 (schools in water less than 16 ft.)  
2.58 (schools in water 16 ft - 26 ft)

<sup>c</sup>Rating (of survey conditions): A) Excellent; B) Good; C) Fair; D) Poor; E) Unsatisfactory

<sup>d</sup>Documented as juvenile herring.

<sup>e</sup>Partial Survey



Table 5. NORTH PENINSULA SAC-ROE HERRING AGE CLASS COMPOSITION FROM COMMERCIAL SEINE SAMPLES, 1988

Date	Sample Size	Age Class									Tons Harvested	
		3	4	5	6	7	8	9	10	11+		
<u>HERENDEEN BAY SECTION</u>												
May 28	181		6	41	55	45	16	8	5	3	2	4.8
June 6	31		-	7	8	2	3	-	2	4	5	3.4
TOTAL	212	%	3	23	30	22	9	4	3	3	3	8.2
<u>INNER MOLLER BAY SECTION</u>												
June 9	193		-	54	48	25	13	11	11	20	11	73.8
June 12	62		2	10	19	10	5	3	2	4	7	6.7
June 16	77		1	35	29	4	2	2	3	1	-	205.0
TOTAL	332	%	1	30	29	12	6	5	5	8	5	285.5

Table 6. PERCENT AGE CLASS COMPOSITION OF NORTH PENINSULA COMMERCIAL HERRING SAMPLES BY GEOGRAPHIC AREA BY YEAR

Year	AGE CLASS								
	3	4	5	6	7	8	9	10	11
<u>HERENDEEN BAY</u>									
1985	5	49	21	15	6	4	-	-	-
1986	-	3	25	13	20	21	17	1	-
1987	2	4	22	24	17	13	10	6	2
1988	3	23	30	22	9	4	3	3	2
<u>INNER MOLLER BAY</u>									
1985	1	12	8	15	33	27	2	-	1
1986	1	7	21	12	18	19	20	1	1
1987	2	11	13	22	12	11	17	11	-
1988	1	30	29	12	6	5	5	8	5
<u>OUTER MOLLER/ BEAR RIVER</u>									
1985	1	26	16	20	17	17	1	1	-
1986	-	2	22	13	21	23	18	1	-
1987	2	48	9	14	5	11	8	3	-
1988	-NO FISH HARVESTED IN THIS SECTION-								

Table 7. SUMMARY OF SOUTH PENINSULA HERRING SAC-ROE LANDINGS BY AREA

<u>Location</u>	<u>1981</u>	<u>1982</u>	<u>1983<sup>a</sup></u>	<u>1984</u>	<u>1985</u>	<u>1986<sup>b</sup></u>	<u>1987</u>	<u>1988</u>
Island Bay <sup>c</sup>	6							
Ramsey Bay <sup>c</sup>	27			30	11			.3 <sup>d</sup>
Clarks Bay <sup>c</sup>	29							
Orzenoi Bay <sup>c</sup>	60							
American Bay <sup>c</sup>								
Balboa Bay	36	5		25				11
Beaver Bay								
Little Coal Bay								
Pavlof	225				95	61	91.7	69.3
Canoe Bay	168	133		156	239	140.5	117.7	236.5
Volcano/Dolgoi Island	65					13		17
Iliasik Is.	6							
Belkofski Bay	9					8	37.8	12
King Cove	7							
Lenard Harbor	78					59	59.5	30.7
Dolgoi Harbor							12.3	
TOTAL	716	138		211	345	281.5	319.0	

<sup>a</sup>The entire South Peninsula was closed to sac-roë herring fishing in 1983 in favor of a bait fishery that never developed.

<sup>b</sup>Stepovak Bay (Kupreanof Point to Swedania Point) was closed in 1986 and 1987 due to declining biomass trends.

<sup>c</sup>These bays are located inside Stepovak Bay

<sup>d</sup>Seven tons of green herring dumped on May 7, two tons dumped on May 11.

Table 8. 1988 SOUTH PENINSULA COMMERCIAL SAC-ROE HERRING CATCHES  
(Short Tons)

Area	Date	Tons	Roe %
Canoe Bay	May 31	24.4	7.0
	June 3	19.6	7.3
	June 5	41.3	9.3
	June 6	63.2	9.2
	June 8	40.0	9.7
	<u>June 9</u>	<u>48.0</u>	<u>9.3</u>
	TOTAL	236.5	8.9
Pavlof Bay	June 12	32.3	7.0
	June 15	25.0	7.2
	<u>June 17</u>	<u>12.0</u>	<u>10.1</u>
	TOTAL	69.3	7.6
Lenard Harbor	June 12	12.7	8.1
	<u>June 18</u>	<u>18.0</u>	<u>9.1</u>
	TOTAL	30.7	8.7
Volcano	June 18	17.0	8.1
Belkofski	June 20	12.0	10.1
Balboa	May 14	11.0	7.0
Stepovak <sup>a</sup>	June 14	.3	
TOTAL		376.8	8.6%

<sup>a</sup>Not included in harvest totals are 7 tons of green fish taken but not sold May 7 and 2 tons taken on May 11.

Table 9. ALASKA DEPARTMENT OF FISH AND GAME SOUTH PENINSULA AERIAL SURVEYS<sup>a</sup> 1988

<u>Area</u>	<u>Date</u>	<u>RAI<sup>b</sup></u>	<u>Conditions</u>
Canoe Bay	May 19	1	B
	June 6	115	B
	June 6	47	B
	June 11	39	A
	June 15	30	B
	June 16	71	B
	June 17	47	B
Balboa Bay	May 19	0	B
	May 20	26	B
	May 21	16	B
	June 2	121	B
Island Bay	May 21	57	C
	June 2	45	B
Granville	May 21	5	C
	June 2	45	B
Fox Bay	June 2	40	B
Dome Point	June 2	30	B
Pad Island	June 2	65	B
Ramsey Bay	May 21	1	C
	June 2	80	B
Grub Gulch	May 21	30	B
	June 2	40	B
Clark Bay	May 21	25	B
	June 2	20	B
Orzinski	May 21	15	B
American Bay	May 21	10	B
American	June 2	45	B
West Cove	May 19	3	B
Chicago	June 2	40	B
Dorenoi	May 21	7	B
	May 23	71	B
	June 2	50	B
San Diego	May 21	35	B
	May 23	30	B
	June 2	63	B
Gillemont	June 2	224	B
Swedania	May 21	5	B
Beaver	June 2	85	B
Pavlof	June 16	0	C

Table 9. (Continued) ALASKA DEPARTMENT OF FISH AND GAME SOUTH PENINSULA AERIAL SURVEYS<sup>a</sup> 1988

<u>Area</u>	<u>Date</u>	<u>RAI<sup>b</sup></u>	<u>Conditions</u>
Arch Point	June 16	5	B
Dolgoi	June 16	15	B
Volcano	June 16	0	B
Bear Bay	June 16	5	B
Belkofski	June 16	5	B
Lenard	June 16	0	B

<sup>a</sup>Species identification is difficult, many of schools spotted probably were capelin.

<sup>b</sup>RAI = (Relative Abundance Index) units express the entire surface area of sighted herring schools in terms of small schools (surface area equal to 538<sup>2</sup> ft.). For example 10 RAI units is equivalent to 10 small herring schools each with a surface area of 538<sup>2</sup> ft.

Table 10. SOUTH PENINSULA SAC-ROE HERRING AGE CLASS COMPOSITION FROM COMMERCIAL SEINE SAMPLES, 1988

Date	Area	Sample Size	Age Class									Tons Harvested
			3	4	5	6	7	8	9	10	11	
5/30	Canoe Bay	68	18	26	18	-	-	5	1	-	-	0
6/1		29	13	9	2	-	1	3	-	1	-	24
6/5		108	11	28	23	1	2	29	8	4	2	61
6/6		81	26	27	14	-	1	9	3	1	-	151
	TOTAL	286	% 24	31	20	-	1	16	4	2	1	
6/16	Pavlof	44	% 34	50	5	-	2	7	-	2	-	
5/15	Balboa	145	% 32	50	9	-	1	3	1	2	3	
5/6	Stepovak Flats <sup>a</sup>	90	4	70	16	-	-	-	-	-	-	
5/10		57	3	44	9	-	-	1	-	-	-	
	TOTAL	147										

<sup>a</sup>Gillnet samples, less than one ton was harvested in Stepovak Bay.

Table 11. PERCENT AGE CLASS COMPOSITION OF SOUTH PENINSULA COMMERCIAL HERRING SAMPLES BY GEOGRAPHIC AREA BY YEAR IN CANOE BAY

Year	AGE CLASS								
	3	4	5	6	7	8	9	10	11
1985	1	3	81	7	6	1	1	0	1
1986	6	-	3	82	6	2	-	1	-
1987	25	28	1	5	34	3	3	-	-
1988	24	31	20	-	1	16	4	2	1

4  
6



Figure 1. ALASKA PENINSULA-ALEUTIAN IS.  
Boundaries in Geographical  
Relation to Western Alaska.

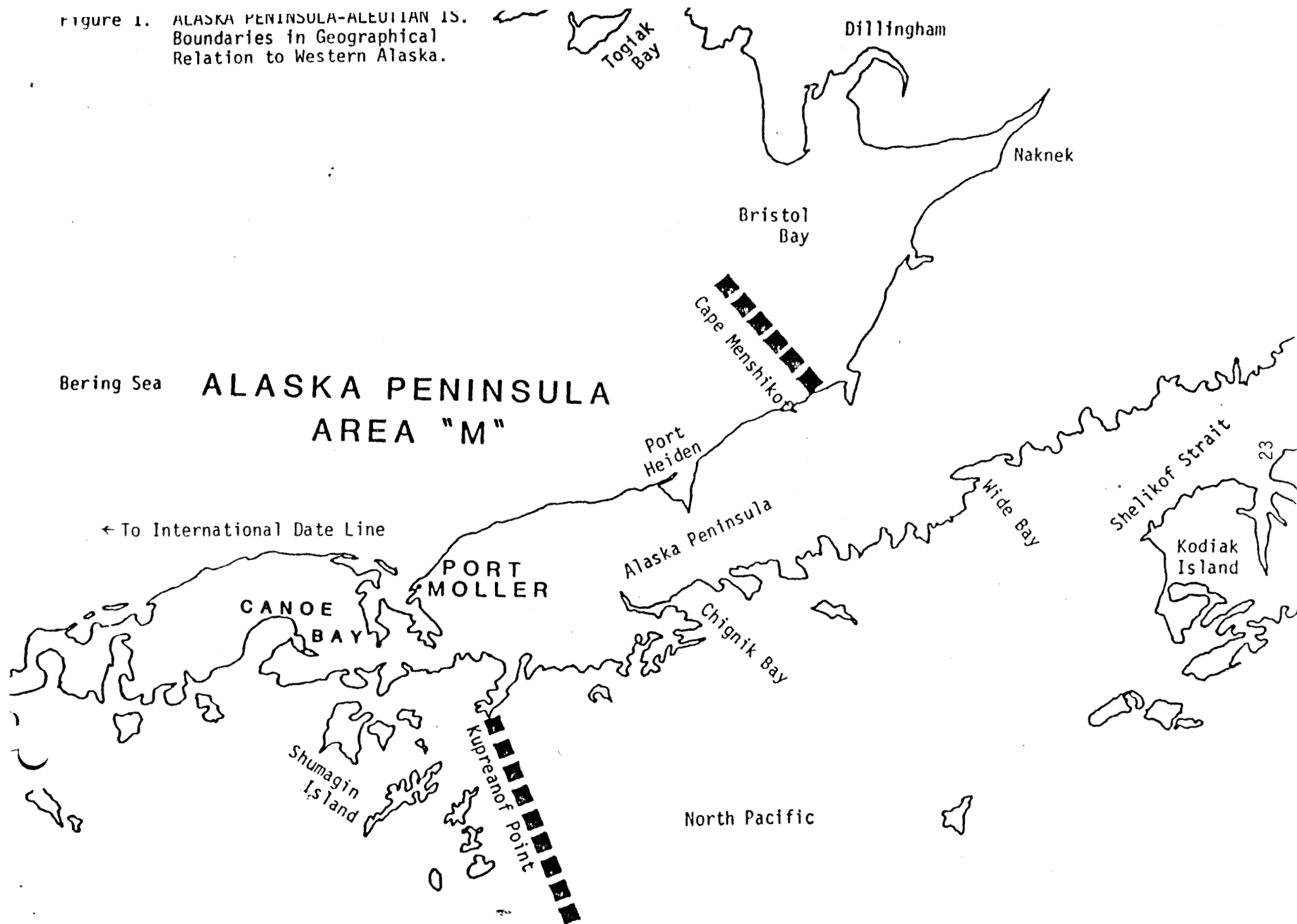


Figure 2. Location of Peninsula Sac-Roe Herring Landings, 1988

# 1988 PENINSULA SAC-ROE HERRING LANDINGS BY LOCATION

NORTH PENINSULA **X**

SOUTH PENINSULA **O**

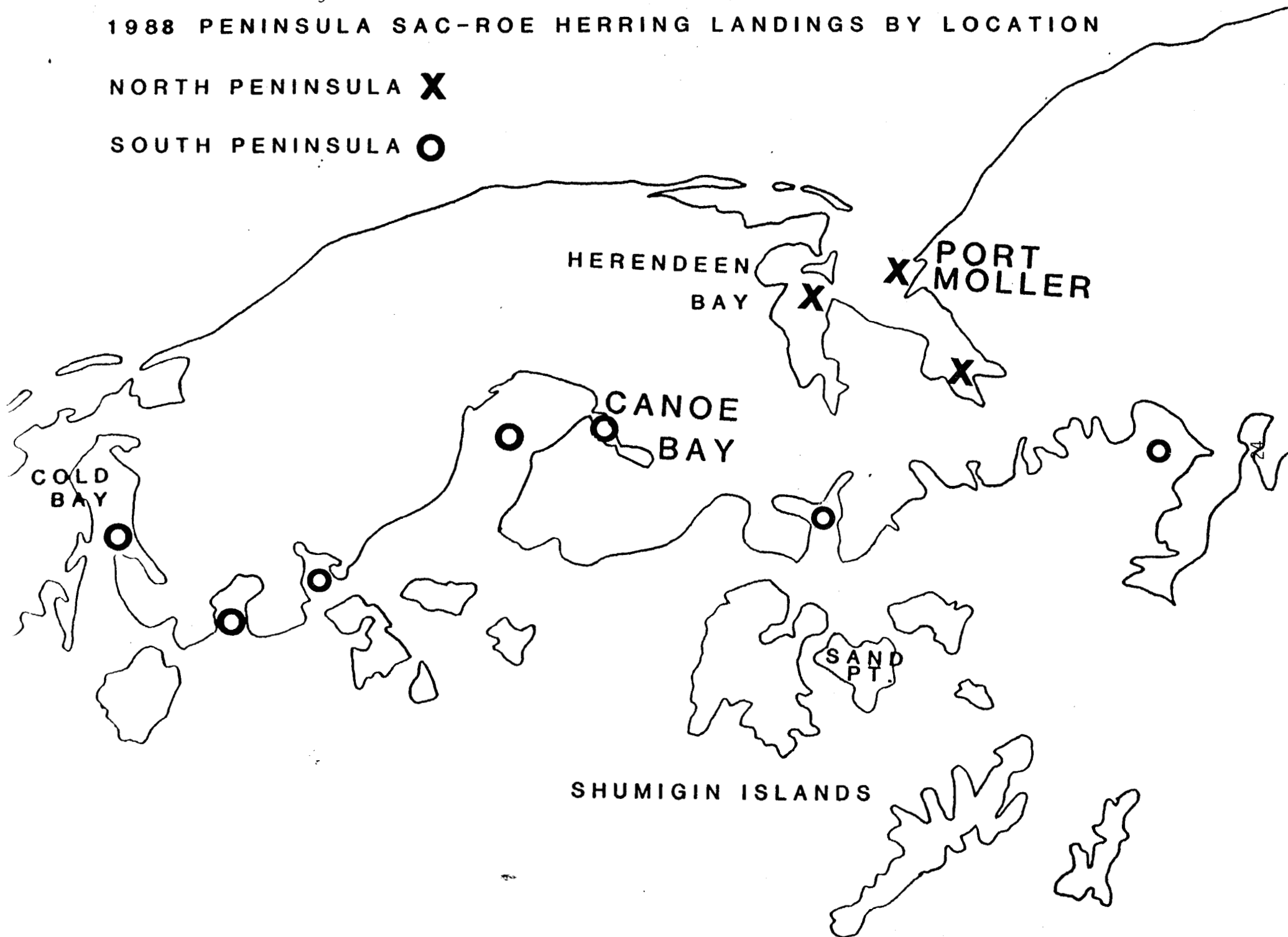


Figure 3. North Peninsula Commercial Sac-Roe Herring Age Frequency  
Comparisons by Area by Year.

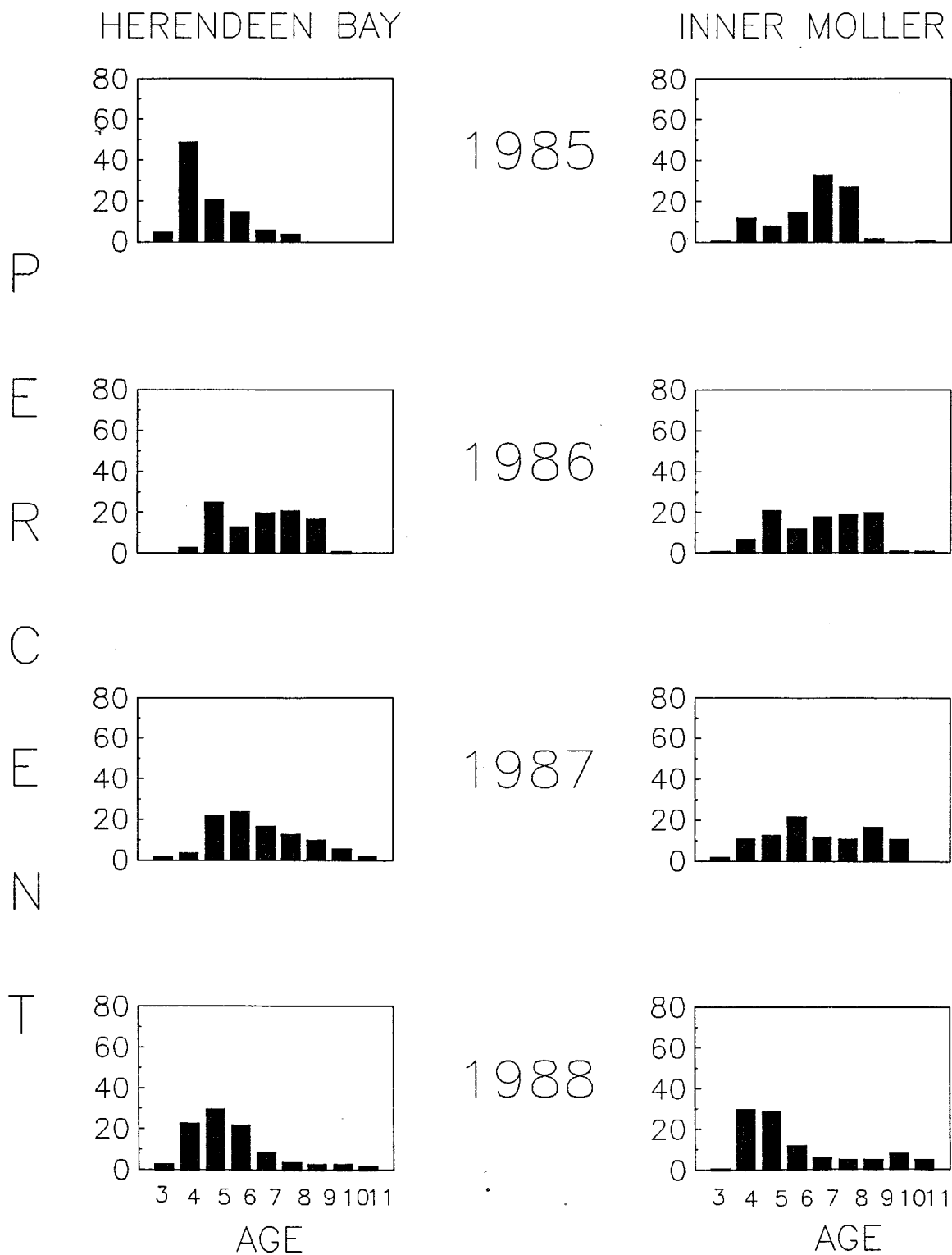
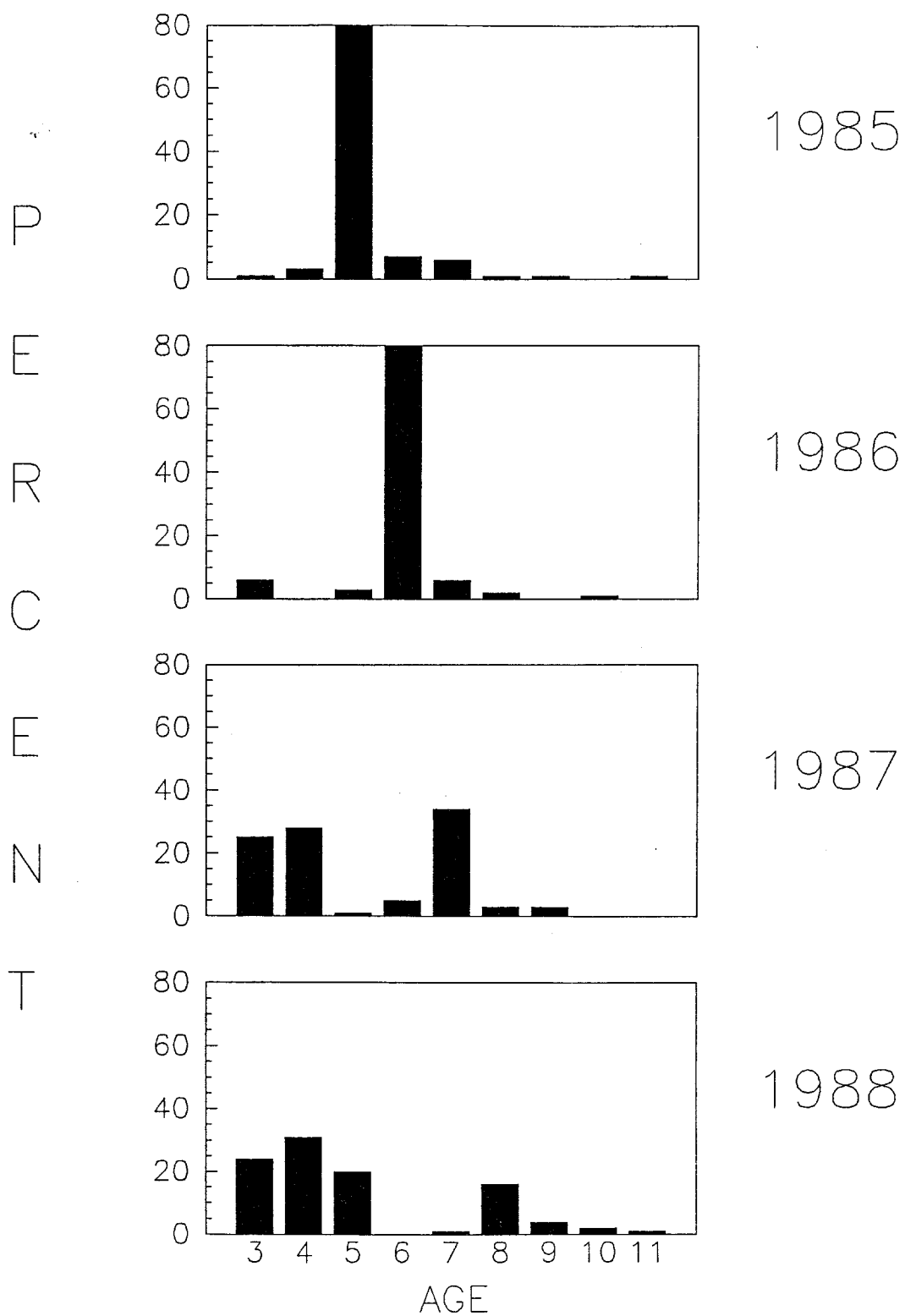


Figure 4. Canoe Bay Commercial Sac-Roe Herring Age Frequency Comparisons by Year.



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